What is claimed is:

1. A laser-diode-pumped solid-state laser apparatus comprising:

a solid-state laser medium, which absorbs a pumping light to generate or amplify light of a predetermined wavelength;

a laser diode light source, which generates said pumping light and introduces the generated pumping light into the laser medium directly or via an optical device; and

a fluorescence detection unit for detecting a quantity of fluorescence generated from the solid-state laser medium at a position inside a laser resonator composing the solid-state laser apparatus, the position being near an optical axis of a laser oscillation light generated in the resonator and not blocking the optical axis.

2. The laser-diode-pumped solid-state laser apparatus according to Claim 1, wherein

said pumping light is introduced from a direction approximately perpendicular to the optical axis of said laser oscillation light.

3. The laser-diode-pumped solid-state laser apparatus according to Claim 1, wherein

said fluorescence detection unit comprises: optical unit disposed in a position near said optical axis of the laser oscillation light and not blocking the optical axis; and a photo-detector that detects said fluorescence introduced by said optical unit.

4. The laser-diode-pumped solid-state laser

apparatus according to Claim 3, wherein

said optical unit includes a mirror for reflecting said fluorescence emitted from the solid-state laser medium, and said fluorescence reflected by the mirror propagates in space and is made incident into said photo-detector disposed in a predetermined position.

5. The laser-diode-pumped solid-state laser apparatus according to Claim 4, wherein

said mirror is formed in a parabolic shape, and said fluorescence reflected by the mirror propagates in space and focuses on said photo-detector.

6. The laser-diode-pumped solid-state laser apparatus according to Claim 3, wherein

said optical unit comprises a transparent medium in the wavelength of said fluorescence, and said fluorescence made incident from one end of the medium propagates through the medium and is made incident into said photo-detector disposed at the other end.

7. The laser-diode-pumped solid-state laser apparatus according to Claim 6, wherein

said optical unit is formed so as to surround a periphery of an optical axis in a part of the optical path of said laser oscillation light, and said fluorescence made incident from an end portion of an opening provided in said optical unit is guided into said photo-detector disposed in a predetermined position on an end portion of an outer periphery.

8. The laser-diode-pumped solid-state laser

apparatus according to Claim 7, wherein

said optical unit forms any of a disc shape, a polygonal shape and an elliptic shape.

9. The laser-diode-pumped solid-state laser apparatus according to Claim 8, wherein

the center of said opening is arranged at a first focal point of said elliptic shape, and said photo-detector is arranged at a second focal point.

10. The laser-diode-pumped solid-state laser apparatus according to Claim 7, comprising:

reflection unit for reflecting said fluorescence in a region of an outer periphery of said optical unit except for the vicinity of said photo-detector, wherein

said fluorescence made incident from the end portion of said opening is reflected by said reflection unit and guided into said photo-detector.

11. The laser-diode-pumped solid-state laser apparatus according to Claim 7, wherein

a plurality of said photo-detectors are disposed all around the outer periphery of said optical unit, and

any of an axial symmetry of said laser beam and degradation of said laser diode light source is identified by comparing output from a plurality of the photo-detectors.

12. The laser-diode-pumped solid-state laser apparatus according to Claim 7, wherein

the diameter of said opening is set smaller than the diameter of said laser medium.

13. The laser-diode-pumped solid-state laser

apparatus according to Claim 6, wherein

said transparent medium is made up of glass as a parent material.

14. The laser-diode-pumped solid-state laser apparatus according to Claim 6, wherein

said transparent medium is made up of any of a material that selectively attenuates light having the wavelength of said pumping light and a material that selectively transmits a wavelength of a fluorescence emission line spectrum that is not used in laser oscillation.

15. The laser-diode-pumped solid-state laser apparatus according to Claim 1, further comprising:

a filter selectively attenuates light having the wavelength of said pumping light on the optical path of said fluorescence reaching said photo-detector.

16. The laser-diode-pumped solid-state laser apparatus according to Claim 1, further comprising:

a filter selectively transmits a wavelength of a fluorescence emission line spectrum that is not used in laser oscillation out of said fluorescence emitted from said solid-state laser medium, on the optical path of said fluorescence reaching said photo-detector.

17. The laser-diode-pumped solid-state laser apparatus according to Claim 1, wherein

said laser diode light source includes: a plurality of laser diode devices; a power source that drives a plurality of said laser diode devices in a predetermined number of groups; and controller for controlling the drive

current of said power source, wherein said controller adjusts the drive current for each of said groups in accordance with the intensity of said fluorescence detected by said photo-detector.

18. A status diagnostic method of a laser-diode-pumped solid-state laser apparatus having: a solid-state laser medium, which absorbs a pumping light to generate or amplify beam of a predetermined wavelength; a laser diode light source, which generates said pumping light and introduces the generated pumping light into the laser medium directly or via an optical device; and a fluorescence detection unit provided at a position in a laser resonator, which composes the solid-state laser apparatus, near an optical axis of a laser oscillation light generated in the resonator and not blocking the optical axis,

said status diagnostic method comprising the steps of:

detecting a quantity of the fluorescence generated from the solid-state laser medium by said fluorescence detection unit; and

comparing said quantity of the fluorescence with any one of a predetermined value and a previously measured value to diagnose degradation status of said laser diode light source.

19. The status diagnostic method of a laser-diode-pumped solid-state laser apparatus according to Claim 18, wherein

said fluorescence detection unit comprises: optical

unit disposed in a position near said optical axis of the laser oscillation light and not blocking the optical axis; and a photo-detector that detects said fluorescence introduced by said optical unit.

20. The status diagnostic method of a laser-diode-pumped solid-state laser apparatus according to Claim 18 wherein

said optical unit includes a mirror for reflecting said fluorescence emitted from the solid-state laser medium, and said fluorescence reflected by the mirror is propagated in space and is made incident into said photo-detector disposed in a predetermined position.

21. The status diagnostic method of a laser-diode-pumped solid-state laser apparatus according to Claim 20, wherein

said mirror is formed in a parabolic shape, and said fluorescence reflected by the mirror is propagated in space and focused on said photo-detector.

22. The status diagnostic method of a laser-diode-pumped solid-state laser apparatus according to Claim 18, wherein

said optical unit comprises a transparent medium in the wavelength of said fluorescence, and said fluorescence made incident from one end of the medium is propagated through the medium and made incident into said photo-detector disposed at the other end.

23. The status diagnostic method of a laser-diode-pumped solid-state laser apparatus according to Claim 22,

wherein

said optical unit is formed so as to surround a periphery of an optical axis in a part of the optical path of said laser oscillation light, and said fluorescence made incident from an end portion of an opening provided in said optical unit is guided into said photo-detector disposed in a predetermined position on an end portion of an outer periphery.

24. The status diagnostic method of a laser-diode-pumped solid-state laser apparatus according to Claim 23, wherein

said optical unit forms any of a disc shape, a polygonal shape and an elliptic shape.

25. The status diagnostic method of a laser-diode-pumped solid-state laser apparatus according to Claim 24, wherein

the center of said opening is arranged at a first focal point of said elliptic shape, and said photo-detector is arranged at a second focal point.

26. The status diagnostic method of a laser-diode-pumped solid-state laser apparatus according to any one of Claims 23, wherein

reflection unit for reflecting said fluorescence is included in a region of an outer periphery of said optical unit except for the vicinity of said photo-detector, and

said fluorescence made incident from the end portion of said opening is reflected by said reflection unit and guided into said photo-detector.

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27. The status diagnostic method of a laser-diode-pumped solid-state laser apparatus according to Claim 23, wherein

a plurality of said photo-detectors are disposed all around the outer periphery of said optical unit, and

any of an axial symmetry of said laser beam and degradation of said laser diode light source is identified by comparing output from a plurality of the photo-detectors.

28. The status diagnostic method of a laser-diode-pumped solid-state laser apparatus according to Claim 23, wherein

the diameter of said opening is set smaller than the diameter of said laser medium, said medium controls a laser beam having a large divergent angle, and the divergent angle of said laser beam is thus controlled.

29. The status diagnostic method of a laser-diode-pumped solid-state laser apparatus according to Claim 18, wherein

at least one of a filter selectively attenuates light having the wavelength of said pumping light and a filter selectively transmits the wavelength of a fluorescence emission line spectrum that is not used in laser oscillation out of said fluorescence emitted from said solid-state laser medium is included on the optical path of said fluorescence reaching said photo-detector.

30. The status diagnostic method of a laser-diode-pumped solid-state laser apparatus according to Claim 18, wherein

said transparent medium is made up of any of a material that selectively attenuates light having the wavelength of said pumping light and a material that selectively transmits a wavelength of a fluorescence emission line spectrum that is not used in laser oscillation.

31. The status diagnostic method of a laser-diode-pumped solid-state laser apparatus according to Claim 18, wherein

said laser diode light source includes: a plurality of laser diode devices; a power source that drives a plurality of said laser diode devices in a predetermined number of groups; and controller for controlling the drive current of said power source, and said controller adjusts the drive current for each of said groups in accordance with the intensity of said fluorescence detected by said photo-detector.